

We claim:

1. A method of controlling target living species with an active control ingredient over an extended period of time, which comprises the steps of:
 - (a) liquefying an active control agent;
 - 5 (b) loading an intercalated nanoclay retaining an ammonium ion chemical having 6 or more carbon atoms with said liquefied active control agent;
 - (c) forming said loaded nanoclay into a barrier for control of said target living species.
- 10 2. The method of claim 1, further comprising loading a liquefied polymer with said loaded intercalated nanoclay, said polymer recalcitrant to release of said control ingredient; and forming said loaded liquefied polymer into polymer particulates, which are formed into said barrier.
- 15 3. The method of claim 2, further comprising adding said loaded intercalated nanoclay into a forming polymer, which is formed into said barrier.
4. The method of claim 1, wherein said intercalated nanoclay has a moisture content of less than 4%.
- 20 5. The method of claim 1, wherein said loaded nanoclay is exfoliated into particulates having an aspect ratio of between about 10:1 and about 1500:1, and a thin dimension of between about 0.1 nm and 10 nm.
- 25 6. The method of claim 1, wherein said target living species is one or more of plants, animals, fungi, bacteria, viruses, insects, fish, or mollusk.
7. The method of claim 1, wherein said active control ingredient is one or more of a chemical agent or a biological agent, which one or more of repels, attracts, kills, or exerts a desired action on said target living species.
- 30 8. The method of claim 1, wherein said nanoclay is derived by intercalation of one or more of a smectite, a vermiculite, or illite.

9. The method of claim 8, wherein said nanoclay is derived by intercalation of one or more of montmorillonite, beidellite, nontronite, saponite, saucnite, or bentonite.
- 5 10. The method of claim 1, wherein said target living species comprises a pest species.
11. The method of claim 10, wherein said pest species comprises one or more of microbes, fungi, algae, bacteria, viruses, spores, insects, birds, sea animals
10 land animals, or rodents.
12. The method of claim 1, wherein said active control ingredient comprises one or more of an insecticide or a molluscide.
- 15 13. The method of claim 1, wherein said active control ingredient comprises a herbicide.
14. The method of claim 1, wherein said polymer is one or more of polyurethane, polyethylene, polypropylene, polybutenes, natural rubber, polyisoprene,
20 polyesters, styrene butadiene rubber, EPDM, polyacrylates, polymethacrylates, polyethylene terephthalate, polypropylene terephthalate, nylon 6, nylon 66, polylactic acid, polyhydroxy butyrate, polycarbonate, epoxy resins, or unsaturated polyester resins.
- 25 15. The method of claim 10, wherein said active control ingredient is one or more of pyrethrins, isofenphos, fenvalerate, cypermethrin, permethrin, bifenthrin, endosulfan, organophosphate type insecticides, skunk oils, and extracts of pepper.
- 30 16. The method of claim 1, wherein said active control ingredient comprises perfumes, sex pheromones, and the like.

17. The method of claim 10, wherein said target living species comprises one or more of termites, ants, fire ants, roaches, mosquitoes, coffee berry borers, boring wasps, deer, squirrels, mice, rats, clams, oysters, or mussels.
- 5 18. The method of claim 1, wherein said loading in step (b) is without use of water or organic solvents, and wherein said loaded nanoclay comprises intercalated, tactoid, and exfoliated clay species.
- 10 19. The method of claim 1, wherein the ammonium salt is one or more of protonated octadecyl amine, methyl tallow bis (2-hydroxyethyl) ammonium salt, or dimethyl dialkyl [C₁₄-C₁₈] ammonium salt.
- 15 20. The method of claim 2, wherein said recalcitrant polymer is one or more of polyurethane polymer, polyethylene, polypropylene, polybutenes, natural rubber, polyisoprene, polyesters, styrene butadiene rubber, EPDM, polyacrylates, polymethacrylates, polyethylene terephthalate, polypropylene terephthalate, nylon 6, nylon 66, polylactic acid, polyhydroxy butyrate, polycarbonate, epoxy resins, or unsaturated polyester resins.
- 20 21. A method of forming an active control ingredient that controls target living species over an extended period of time, which comprises the steps of:
 - (a) liquefying an active control agent; and
 - (b) loading an intercalated nanoclay retaining an ammonium ion chemical having 6 or more carbon atoms with said liquefied active control agent.
- 25 22. The method of claim 21, further comprising:
 - (c) loading a liquefied polymer with said loaded intercalated nanoclay, said polymer recalcitrant to release of said control ingredient.
- 30 23. The method of claim 21, further comprising:
 - (c) loading a forming polymer with said loaded intercalated nanoclay,
24. The method of claim 21, wherein said intercalated nanoclay has a moisture content of less than 4%.

25. The method of claim 21, wherein said loaded nanoclay is exfoliated into particulates having an aspect ratio of between about 10:1 and about 1500:1, and a thin dimension of between about 0.1 nm and 10 nm.

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26. The method of claim 21, wherein said active control ingredient is one or more of a chemical agent or a biological agent, which one or more of repels, attracts, kills, or exerts a desired action on said target living species.

10 27. The method of claim 21, wherein said nanoclay is derived by intercalation of one or more of a smectite, a vermiculite, or illite.

28. The method of claim 27, wherein said nanoclay is one or more of montmorillonite, beidellite, nontronite, saponite, saucomite, or bentonite.

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29. The method of claim 21, wherein the ammonium salt is one or more of protonated octadecyl amine, methyl tallow bis (2-hydroxyethyl) ammonium salt, or dimethyl diiakyl [C₁₄-C₁₈] ammonium salt.

20 30. An active control ingredient that is effective in controlling target living species over an extended period of time, which comprises:
an intercalated nanoclay retaining an ammonium ion chemical having 6 or more carbon atoms loaded with an active control agent.

25 31. The active control ingredient of claim 30, loaded into polymer pellets formed from a polymer that is recalcitrant to release of said active control agent.

32. The active control ingredient of claim 30, wherein said recalcitrant polymer is one or more of polyurethane polymer, polyethylene, polypropylene, polybutenes, natural rubber, polyisoprene, polyesters, styrene butadiene rubber, EPDM, polyacrylates, polymethacrylates, polyethylene terephthalate, polypropylene terephthalate, nylon 6, nylon 66, polylactic acid, polyhydroxy butyrate, polycarbonate, epoxy resins, or unsaturated polyester resins.

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33. The active control ingredient of claim 30, wherein said intercalated nanoclay has a moisture content of less than 4%.
34. The active control ingredient of claim 30, wherein said loaded polymer is exfoliated into particulates having an aspect ratio of between about 10:1 and about 1500:1, and a thin dimension of between about 0.1 nm and 10 nm.
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35. The active control ingredient of claim 30, wherein said active control ingredient is one or more of a chemical agent or a biological agent, which one or more of repels, attracts, kills, or exerts a desired action on said target living species.
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36. The active control ingredient of claim 30, wherein said nanoclay is derived by intercalation of one or more of a smectite, a vermiculite, or illite.
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37. The active control ingredient of claim 36, wherein said nanoclay is one or more of montmorillonite, beidellite, nontronite, saponite, sauconite, or bentonite.
38. The active control ingredient of claim 30, wherein the ammonium salt is one or more of protonated octadecyl amine, methyl tallow bis (2-hydroxyethyl) ammonium salt, or dimethyl dialkyl [C₁₄-C₁₈] ammonium salt.
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